SECTION 1
INTRODUCTION

1.1 BACKGROUND

The National Telecommunications and Information Administration (NTIA) is responsible for managing the Federal Government's use, of the radio frequency spectrum. NTIA's responsibilities include establishing policies concerning spectrum assignment, allocation and use, and providing various departments and agencies with guidance to ensure that their conduct of telecommunication activities is consistent with these policies.[1] In discharging these responsibilities, NTIA assesses spectrum utilization, identifying existing and/or potential compatibility problems among the telecommunication systems that belong to various departments and agencies, provides recommendations for resolving any compatibility conflicts that may exist in the use of the radio frequency spectrum, and recommends changes to promote spectrum efficiency and improve spectrum management procedures.

This report addresses possible causes and solutions to reported cases of interference to earth stations from radar stations. (Radar stations include radiolocation, radionavigation and meteorological radar stations.) In recent years, NTIA has noted a significant increase in the number of reported cases of interference to 3700- to 4200-MHz (hereafter referred to in this report as "4-GHz band") fixed-satellite service earth stations from radar stations allocated in adjacent spectral bands between 2700 and 3700 MHz. Both the desired and interfering signal paths are shown schematically in Figure 1. The increase in interference has been largely attributed to the rapid growth of television receive-only (TVRO) and audio distribution earth stations. Because many of the radars that have been involved in these cases have been Federal Government systems, NTIA has had responsibility for investigating the causes of such interference, as well as for developing solutions to these problems.

1.2 OBJECTIVE

The objective of this task was to develop procedures to assess the potential for interference, and techniques to minimize electromagnetic compatibility (EMC) conflicts, between radar stations operating in the 2700- to 3700-MHz portion of the spectrum and fixed-satellite service (space-to-earth) earth stations operating in the 4-GHz band.

1.3 APPROACH

In order to accomplish the objective of this task, the following approach was taken:

a) determine the mechanism(s) by which the interference from radars to fixed-satellite earth station receivers occurs, through measurements by NTIA at several earth station sites and laboratory testing at the NTIA Institute for Telecommunication Sciences (ITS) in Boulder, CO

---

1 NTIA, "Manual of Regulations and Procedures for Federal Radio Frequency Management," U.S. Department of Commerce, National Telecommunications and Information Administration, May 1992 edition with revisions September 1993 and May 1994. (Hereafter referred to as the "NTIA Manual").

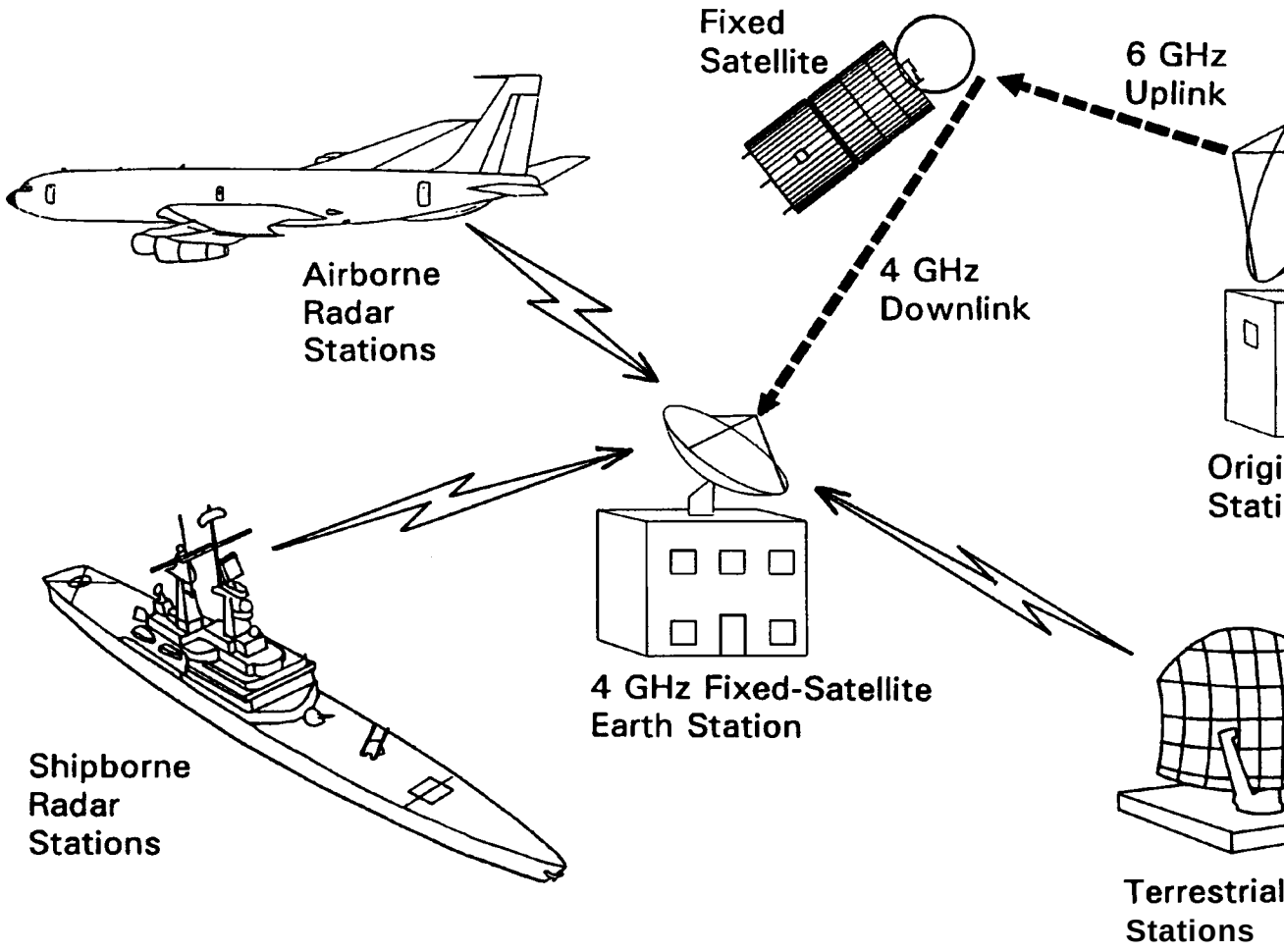

Figure 1. **Fixed-satellite earth stations operating in the 3700- to 4200-MHz (4-GHz) band may exp ence from airborne, shipborne and terrestrial radar stations.**

b) identify various interference mitigation methods, applicable to both radar stations and fixed-satellite earth stations

c) determine the degradation criteria and susceptibility of 4-GHz fixed-satellite earth station receiver systems to interference from radar emissions

d) determine the emission characteristics (frequency domain and time domain) of interfering radars, using NTIA's Radio Spectrum Measurement System (RSMS) van and portable Compact Radio Spectrum Measurement Systems (CRSMS)

e) determine separation distances at which interference from radar stations to earth stations may occur for each identified interference coupling mechanism

f) determine measurement procedures to identify the interference coupling mechanism(s) at earth stations experiencing interference.